specification and claim(s) by the current amendment. The attached page(s) is captioned "Version With Markings To Show Changes Made."

As requested by the Examiner, a proposed drawing change to Fig. 7 is attached hereto, with the proposed change being shown in red ink.

Two IDS Filings to be Considered

Initially, it is respectfully requested that the Examiner consider the IDS filings of March 7, 2003 and May 2, 2003, and provide the undersigned with initialed copies of the PTO-1449s corresponding to the same.

General

For purposes of example, and without limitation, certain example embodiments of the instant invention relate to an LCD having a supplemental capacitance. In particular, the materials and thicknesses of various material(s) making up the supplemental capacitance are selected in order to maximize transmittance of the LCD at a particular wavelength(s) λ. In the Fig. 2 embodiment of the instant invention, the supplemental capacitance is made up of pixel electrode 3, transparent common electrode 21, and dielectric film 22 (e.g., silicon nitride) provided between the electrodes 3, 21.

As best shown in Figs. 1-2, the pixel electrode 3 has edge portions overlapping at least one gate bus line 1 and at least one source bus line 2 formed on the substrate, and the common electrode 21 is arranged between the gate bus line 1 and the pixel electrode 3 and between the source bus line 2 and the pixel electrode 3 so as to cover the gate bus line and the source bus line (e.g., pg. 10, lines 11-14; and Fig. 1). Thus, advantageously, the gate bus line and source bus line act as a black matrix. thereby obviating the need for

separately formed black matrix portion(s) so that cost and/or processing burdens can be reduced (e.g., pg. 10, lines 15-24). Moreover, the common electrode 21 is located between the bus lines and the pixel electrode 3 so as to cover at least portions of the bus lines; this is advantageous in that electric fields attributed to the bus line signals can be shielded by the common electrode thereby allowing display quality to be improved (e.g., pg. 10, line 24 to pg. 11, line 8).

Additionally, the instant inventor has surprisingly found that by controlling the material and thickness of various layer(s) of the supplemental capacitance, transmittance of the LCD at particular wavelength(s) can be improved. For example, transmittance of the display at a wavelength λ can be maximized by using a dielectric material 22 having a refractive index n and thickness d so as to satisfy the equation: $d = \lambda/(2 \times n) \times m$ (m is an integer) (e.g., pg. 17, line 18 to pg. 18, line 3). The instant inventor has also found that in certain example embodiments, the index of refraction n of the dielectric film 22 should be at least 1.4, and the difference between the refractive indices of film 22 and pixel electrode 3, and the difference between the refractive indices of film 22 and electrode 21, should be no greater than 0.6 (e.g., pg. 19, line 19 to pg. 20, line 4) in order to maximize transmittance. Fig. 4 illustrates an example where the index of refraction n of the film 22 is selected so as to correspond to an apex of a curve plotted with respect to the transmittance vs. the index n. Fig. 4 illustrates that when the refractive index n of the film 22 is approximately 1.9 to 2.1 the transmittance is maximized for the wavelength at issue.

<u>Claim 1</u>

Claim 1 stands rejected under 35 U.S.C. Section 102(b) as being allegedly anticipated by Zhang (US 5,745,195). This Section 102(b) rejection is respectfully traversed for at least the following reasons.

Claim 1 requires that "<u>common electrode . . . . comprised of a transparent conductive film</u> . . . . the pixel electrode of the at least one supplemental capacitance has edge portions overlapping at least one gate bus line and at least one source bus line formed on the insulating substrate, and the <u>common electrode is arranged between the gate bus line and the pixel electrode and between the source bus line and the pixel electrode so as to cover at least portions of the gate bus line and the source bus line so that the gate bus line and source bus line act as a black matrix</u>." For example, Figs. 1-2 of the instant application illustrate that pixel electrode 3 of the supplemental capacitance has edge portions overlapping gate bus lines 1 and source bus lines 2 formed on the insulating substrate. The *common electrode 21 is arranged between the gate bus lines and the pixel electrodes and between the source bus lines and the pixel electrodes so as to* ***cover*** *at least portions of the gate bus lines and the source bus lines.* This is advantageous in that the gate bus lines and source bus lines act as a black matrix, so that a separate black matrix structure need not necessarily be provided (e.g., pg. 10, lines 11-24). Another example advantage associated with this structure is that electric fields attributed to the bus line signals can be shielded by the common electrode thereby allowing display quality to be improved (e.g., pg. 10, line 24 to pg. 11, line 8). The cited art fails to disclose or suggest the aforesaid underlined aspect of claim 1.

Zhang in Fig. 1 discloses an auxiliary capacitance including pixel electrode 117, transparent electrode 115, and dielectric film 116. Zhang's transistor is in communication with source line 113 and coated gate line 111. However, Zhang's alleged common electrode 115 does <u>not</u> cover any portion of source line 113 and is <u>not</u> located between the source line 113 and the pixel electrode 117. For each of these two reasons, it can be seen that Zhang cannot anticipate claim 1. Zhang clearly fails to disclose or suggest a common electrode of an auxiliary capacitance which "is arranged between the gate bus line and the pixel electrode and between the source bus line and the pixel electrode so as to cover at least portions of the gate bus line and the source bus line so that the gate bus line and source bus line act as a black matrix" as recited in claim 1. Instead, Zhang teaches directly away from claim 1 since Zhang is incapable of realizing the aforesaid example advantages associated with the claimed structure.

Citation to Yamazaki cannot cure the fundamental problems of Zhang. In particular, Yamazaki's BM 502 is clearly not a "transparent conductive film" as required by claim 1. Yamazaki teaches directly away from a common electrode comprised of a transparent film since Yamazaki's alleged electrode 502 must be a black matrix (BM). Thus, even the alleged combination of Zhang and Yamazaki (which applicant believes would be incorrect in any event) fails to meet the invention of amended claim 1.

<u>Claims 8 & 15</u>

Claim 8 requires that "for the supplementary capacitance in the pixel region, the <u>supplementary capacitance use transparent insulating film has a film thickness d so as to satisfy the following equation: $d = \lambda / (2 \times n) \times m$</u> where m is an integer, and n is an

index of refraction of the transparent insulating film of the supplementary capacitance, and λ is a wavelength at which transmittance is desired to be increased, so that materials and thicknesses thereof of the supplementary capacitance are selected so as to increase transmittance at the wavelength λ." Selecting a supplementary capacitance insulating film to satisfy the aforesaid equation is clearly beneficial and advantageous for the reasons discussed above. In particular, it has unexpectedly been found that satisfying this claimed equation permits transmittance characteristics of the LCD to be improved.

The cited art fails to disclose or suggest the aforesaid aspect of claim 8. The cited art is entirely unrelated to this aspect of claim 8.

The requirement in claim 15 of "$d = \lambda / (2 \times n) \times m$" is also not disclosed or suggested by the cited art.

Claim 19

Claim 19 requires that "an index of refraction n and a thickness of the dielectric film of the supplemental capacitance are selected in order to ***maximize transmittance at a particular wavelength*** so that the index of refraction n of the dielectric film corresponds to an apex of a curved plotted based on transmittance at the wavelength versus the refractive index of the dielectric film." For example, Fig. 4 of the instant application illustrates an example where the index of refraction n of the film 22 is selected so as to correspond to an apex of a curve plotted with respect to the transmittance vs. the index n. Thus, Fig. 4 illustrates that when the refractive index n of the film 22 is approximately 1.9 to 2.1 the transmittance is maximized for the wavelength at issue.

The cited art fails to disclose or suggest the aforesaid underlined aspect of claim 19.

Claim 23

Claim 23 also requires that an index of refraction and thickness of the dielectric film of the supplemental capacitance are selected in order to maximize transmittance of the display at a particular wavelength. Again, the cited art fails to disclose or suggest this aspect of claim 23.

Claims 24-25

Claims 24-25 require that the another or common electrode is arranged between the gate bus line and the pixel electrode and between the source bus line and the pixel electrode so as to cover the gate bus line and the source bus line so that the gate bus line and source bus line act as a black matrix. Again, as explained above, the cited art fails to disclose or suggest this aspect of these claims.

Conclusion

For at least the foregoing reasons, it is respectfully requested that all rejections be withdrawn. All claims are in condition for allowance. If any minor matter remains to be resolved, the Examiner is invited to telephone the undersigned with regard to the same.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS

Please cancel claim 4.

1. (Amended) A liquid crystal display device comprising:

a thin film transistor array substrate including: pixel use thin film transistors, which are formed on an insulating substrate and each of which has a gate electrode, a source electrode and a drain electrode; pixel electrodes, which are formed on the insulating substrate and comprise[d of a] transparent conductive films connected to the respective pixel use thin film transistors; and [a]supplementary capacitances for retaining electric charges of the pixel electrodes, and a liquid crystal layer held between the thin film transistor array substrate and an opposite substrate,

at least one of the supplementary capacitances being provided by one of the pixel electrodes, a supplementary capacitance use transparent insulating film formed under at least the pixel electrode[s] and a common electrode that is formed under the supplementary capacitance use transparent insulating film and comprised of a transparent conductive film connected to a specified potential, and [the pixel electrodes, the supplementary capacitance use transparent insulating film and the common electrode having a film thickness such that the electrodes and film have a transmittance increased by interference at a specified wavelength.]

wherein the pixel electrode of the at least one supplemental capacitance has edge portions overlapping at least one gate bus line and at least one source bus line formed on

the insulating substrate, and the common electrode is arranged between the gate bus line and the pixel electrode and between the source bus line and the pixel electrode so as to cover at least portions of the gate bus line and the source bus line so that the gate bus line and source bus line act as a black matrix.

Please add the following new claims:

8. (New) A liquid crystal display device comprising:

a thin film transistor array substrate including thin film transistors supported by an insulating substrate and each of which has a gate electrode, a source electrode and a drain electrode; pixel electrodes comprised of transparent conductive films connected to respective thin film transistors; supplementary capacitances for retaining electric charges of the pixel electrodes; and a liquid crystal layer between at least the thin film transistor array substrate and an opposite substrate,

the supplementary capacitance for a pixel region comprising a pixel electrode, a supplementary capacitance use transparent insulating film formed under at least the pixel electrode and a common electrode that is formed under the supplementary capacitance use transparent insulating film and comprised of a transparent conductive film connected to a potential, and

wherein, for the supplementary capacitance in the pixel region, the supplementary capacitance use transparent insulating film has a film thickness d so as to satisfy the following equation:

$$d = \lambda / (2 \times n) \times m$$

where m is an integer, and n is an index of refraction of the transparent insulating film of the supplementary capacitance, and λ is a wavelength at which transmittance is desired to be increased, so that materials and thicknesses thereof of the supplementary capacitance are selected so as to increase transmittance at the wavelength λ.

9. (New) A liquid crystal display device as claimed in claim 8, wherein a difference between a refractive index of the supplementary capacitance use transparent insulating film and a refractive index of the pixel electrodes is set to a value of not greater than 0.6 and a difference between a refractive index of the supplementary capacitance use transparent insulating film and a refractive index of the common electrode is set to a value of not greater than 0.6.

10. (New) A liquid crystal display device as claimed in claim 8, wherein the pixel electrode and the common electrode are made of a material having a specific resistance of 1 mΩ·cm or less.

11. (New) A liquid crystal display device as claimed in claim 8, wherein the pixel electrodes have edge portions overlapping gate bus lines and source bus lines formed on the insulating substrate, and the common electrode is arranged between the gate bus lines and the pixel electrodes and between the source bus lines and the pixel electrodes so as to cover the gate bus lines and the source bus lines.

12. (New) A liquid crystal display device as claimed in claim 8, wherein the supplementary capacitance use transparent insulating film is any one of a silicon oxide film, a silicon nitride film and an organic resin film or a laminate film comprised of at least two of the silicon oxide film, the silicon nitride film and the organic resin film.

13. (New) A liquid crystal display device as claimed in claim 8, wherein the pixel uses a thin film transistor having an active layer comprising polysilicon, and a drive circuit thereof uses thin film transistors whose active layers comprising polysilicon are formed on the insulating substrate identical to the substrate on which the thin film transistor of the pixel is formed.

14. (New) A liquid crystal display device as claimed in claim 13, wherein the active layer of the thin film transistor of the pixel and the transistors of the drive circuit are polysilicon films crystallized by utilizing a catalytic effect of an introduced catalytic element.

15. (New) A liquid crystal display comprising:

a pixel electrode in communication with a switching element and supported by a substrate;

a supplemental capacitance for retaining electric charge of the pixel electrode, the supplemental capacitance being comprised of the pixel electrode, another electrode, and a dielectric film provided between the pixel electrode and the another electrode;

wherein a thickness d and index of refraction n of the dielectric film of the supplemental capacitance are selected to satisfy an equation $d = \lambda / (2 \times n) \times m$, wherein m is an integer, in order to increase transmittance at a wavelength λ.

16. (New) The liquid crystal display of claim 15, wherein the dielectric film of the supplemental capacitance has an index of refraction of at least 1.4, and a difference between respective indices of refraction of the dielectric film and the another electrode is no greater than 0.6.

17. (New) The liquid crystal display of claim 15, wherein the index of refraction of the dielectric film is about 1.9.

18. (New) The liquid crystal display of claim 15, wherein the dielectric film comprises silicon nitride.

19. (New) A liquid crystal display comprising:

a pixel electrode in communication with a switching element and supported by a substrate;

a supplemental capacitance for retaining electric charge of the pixel electrode, the supplemental capacitance being comprised of the pixel electrode, another electrode, and a dielectric film provided between the pixel electrode and the another electrode;

wherein an index of refraction n and a thickness of the dielectric film of the supplemental capacitance are selected in order to maximize transmittance at a particular wavelength so that the index of refraction n of the dielectric film corresponds to an apex of a curved plotted based on transmittance at the wavelength versus the refractive index of the dielectric film.

20. (New) The liquid crystal display of claim 19, wherein the dielectric film of the supplemental capacitance has an index of refraction of at least 1.4, and a difference between respective indices of refraction of the dielectric film and the another electrode is no greater than 0.6.

21. (New) The liquid crystal display of claim 19, wherein the index of refraction of the dielectric film is about 1.9.

22. (New) The liquid crystal display of claim 19, wherein the dielectric film comprises silicon nitride.

23. (New) A liquid crystal display comprising:

a pixel electrode in communication with a switching element and supported by a substrate;

a supplemental capacitance for retaining electric charge of the pixel electrode, the supplemental capacitance being comprised of the pixel electrode, another electrode, and a dielectric film provided between the pixel electrode and the another electrode; and

wherein an index of refraction and thickness of the dielectric film of the supplemental capacitance are selected in order to maximize transmittance of the display at a particular wavelength.

24. (New) The display of claim 23, wherein the pixel electrode has edge portions overlapping at least one gate bus line and at least one source bus line formed on the substrate, and the another electrode is arranged between the gate bus line and the pixel electrode and between the source bus line and the pixel electrode so as to cover the gate bus line and the source bus line so that the gate bus line and source bus line act as a black matrix.

25. (New) The display of claim 8, wherein the pixel electrode has edge portions overlapping at least one gate bus line and at least one source bus line formed on the substrate, and the another electrode is arranged between the gate bus line and the pixel electrode and between the source bus line and the pixel electrode so as to cover the gate bus line and the source bus line so that the gate bus line and source bus line act as a black matrix.